

In the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Currently amended) A light-emitting device with reduced lattice mismatch, comprising:
 - a substrate having a first lattice constant;
 - a first buffer multilayer deposited on said substrate, wherein the lattice constant of said first buffer multilayer ranges from said first lattice constant at the bottom of said first buffer multilayer to a second lattice constant at the top of said first buffer multilayer;
 - a second buffer multilayer deposited on said first buffer multilayer, wherein the lattice constant of said second buffer multilayer ranges from said second lattice constant at the bottom of said second buffer multilayer to a third lattice constant at the top of said second buffer multilayer; and
 - a GaN-base GaN-based epitaxial layer deposited on the surface of said second buffer multilayer with said third lattice constant.
2. (Original) The device as claimed in claim 1, wherein said substrate comprises silicon, said first buffer multilayer is represented by general formula $B_xGa_{(1-x)}P$ (where $0.02 \leq X \leq 1$), and said second buffer multilayer is represented by general formula $In_yGa_{(1-y)}N$ (where $0 \leq y \leq 0.059$).
3. (Canceled)

4. (Currently amended) The ~~method~~ device as claimed in claim 1, wherein said substrate comprises GaP, said first buffer multilayer is represented by general formula $B_xGa_{(1-x)}P$ (where $0 \leq X \leq 1$), and said second buffer multilayer is represented by general formula $In_yGa_{(1-y)}N$ (where $0 \leq y \leq 0.059$).

5. (Currently amended) The ~~method~~ device as claimed in claim 1, wherein said substrate comprises GaAs, said first buffer multilayer comprises $GaAs_xP_{(1-x)}$ and $B_yGa_{(1-y)}P$ (where $0 \leq X \leq 1$, $0 \leq y \leq 1$), and said second buffer multilayer is represented by general formula $In_zGa_{(1-z)}N$ (where $0 \leq z \leq 0.059$).

6. (Currently amended) A light-emitting device with reduced lattice mismatch, comprising:
a silicon substrate having a first lattice constant;
a $B_xGa_{(1-x)}P$ buffer layer (where $0.02 \leq X \leq 1$) deposited on said silicon substrate, wherein the lattice constant of said $B_xGa_{(1-x)}P$ buffer layer ranges from said first lattice constant at the bottom of said $B_xGa_{(1-x)}P$ buffer layer to a second lattice constant at the top of said $B_xGa_{(1-x)}P$ buffer layer;
a $In_yGa_{(1-y)}N$ buffer layer (where $0 \leq y \leq 0.059$) deposited on said $B_xGa_{(1-x)}P$ buffer layer, wherein the lattice constant of the $In_yGa_{(1-y)}N$ buffer layer ranges from said second lattice constant at the bottom of said $In_yGa_{(1-y)}N$ buffer layer to a third lattice constant at the top of said $In_yGa_{(1-y)}N$ buffer layer; and
a GaN-based epitaxial layer deposited on the $In_yGa_{(1-y)}N$ buffer layer with said third lattice constant.

7. (Currently amended) A light-emitting device with reduced lattice mismatch, comprising:

a 3C-SiC substrate having a first lattice constant;

a $B_xGa_{(1-x)}P$ buffer layer (where $0.02 \leq X \leq 1$) deposited on said 3C-SiC substrate,

wherein the lattice constant of said $B_xGa_{(1-x)}P$ buffer layer ranges from said first lattice constant at the bottom of said $B_xGa_{(1-x)}P$ buffer layer to a second lattice constant at the top of said $B_xGa_{(1-x)}P$ buffer layer;

a $In_yGa_{(1-y)}N$ buffer layer (where $0 \leq y \leq 0.059$) deposited on said $B_xGa_{(1-x)}P$ buffer layer, wherein the lattice constant of said $In_yGa_{(1-y)}N$ buffer layer ranges from said second lattice constant at the bottom of said $In_yGa_{(1-y)}N$ buffer layer to a third lattice constant at the top of said $In_yGa_{(1-y)}N$ buffer layer; and

a GaN-based epitaxial layer deposited on the $In_yGa_{(1-y)}N$ buffer layer with third lattice constant.

8. (Currently amended) A light-emitting device with reduced lattice mismatch, comprising:

a GaAs substrate having a first lattice constant;

a $GaAs_xP_{(1-x)}$ buffer layer (where $0 \leq X \leq 1$) deposited on said GaAs substrate, wherein the lattice constant of said $GaAs_xP_{(1-x)}$ buffer layer ranges from said first lattice constant at the bottom of said $GaAs_xP_{(1-x)}$ buffer layer to a second lattice constant at the top of said $GaAs_xP_{(1-x)}$ buffer layer;

a $B_yGa_{(1-y)}P$ buffer layer (where $0 \leq y \leq 1$) deposited on said $GaAs_xP_{(1-x)}$ buffer layer, wherein the lattice constant of said $B_yGa_{(1-y)}P$ buffer layer ranges from said second lattice constant at the bottom of said $B_yGa_{(1-y)}P$ buffer layer to a third lattice constant at the top of said $B_yGa_{(1-y)}P$ buffer layer;

a $\text{In}_z\text{Ga}_{(1-z)}\text{N}$ (where $0 \leq z \leq 0.059$) buffer layer deposited on said $\text{B}_y\text{Ga}_{(1-y)}\text{P}$ buffer layer, wherein the lattice constant of said $\text{In}_z\text{Ga}_{(1-z)}\text{N}$ buffer layer ranges from said third lattice constant at the bottom of said $\text{In}_z\text{Ga}_{(1-z)}\text{N}$ buffer layer to a fourth lattice constant at the top of said $\text{In}_y\text{Ga}_{(1-y)}\text{N}$ buffer layer; and

a GaN-based epitaxial layer deposited on said $\text{In}_z\text{Ga}_{(1-z)}\text{N}$ buffer layer with said fourth lattice constant.

9. (Currently amended) A light-emitting device with reduced lattice mismatch, comprising:

a GaP substrate having a first lattice constant;

a $\text{B}_x\text{Ga}_{(1-x)}\text{P}$ buffer layer (where $0 \leq X \leq 1$) deposited on said GaP substrate, wherein the lattice constant of said $\text{B}_x\text{Ga}_{(1-x)}\text{P}$ buffer layer ranges from said first lattice constant at the bottom of said $\text{B}_x\text{Ga}_{(1-x)}\text{P}$ buffer layer to a second lattice constant at the top of said $\text{B}_x\text{Ga}_{(1-x)}\text{P}$ buffer layer;

a $\text{In}_y\text{Ga}_{(1-y)}\text{N}$ buffer layer (where $0 \leq y \leq 0.059$) deposited on said $\text{B}_x\text{Ga}_{(1-x)}\text{P}$ buffer layer, wherein the lattice constant of said $\text{In}_y\text{Ga}_{(1-y)}\text{N}$ buffer layer ranges from said second lattice constant at the bottom of said $\text{In}_y\text{Ga}_{(1-y)}\text{N}$ buffer layer to a third lattice constant at the top of said $\text{In}_y\text{Ga}_{(1-y)}\text{N}$ buffer layer; and

a GaN-based epitaxial layer deposited on said $\text{In}_y\text{Ga}_{(1-y)}\text{N}$ buffer layer with said third lattice constant.

10. (New) A light-emitting device with reduced lattice mismatch, comprising:

- a 3C-SiC substrate having a first lattice constant;
- a $B_xGa_{(1-x)}P$ buffer layer (where $X=1$) deposited on said 3C-SiC substrate, wherein the lattice constant of said $B_xGa_{(1-x)}P$ buffer layer has a first lattice constant;
- a $In_yGa_{(1-y)}N$ buffer layer (where $0 \leq y \leq 0.059$) deposited on said $B_xGa_{(1-x)}P$ buffer layer, wherein the lattice constant of said $In_yGa_{(1-y)}N$ buffer layer ranges from said first lattice constant at the bottom of said $In_yGa_{(1-y)}N$ buffer layer to a second lattice constant at the top of said $In_yGa_{(1-y)}N$ buffer layer; and
- a GaN-based epitaxial layer deposited on the $In_yGa_{(1-y)}N$ buffer layer with second lattice constant.